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10/571,140	03/09/2006	Fumihiro Yaguchi	0038-0491PUS1	3933

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EXAMINER	
BOBISH, CHRISTOPHER S	

ART UNIT	PAPER NUMBER
3746	

NOTIFICATION DATE	DELIVERY MODE
11/28/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/571,140	YAGUCHI ET AL.	
	Examiner	Art Unit	
	CHRISTOPHER BOBISH	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 August 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) *8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 9-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment filed on 08/11/2008 under 37 CFR 1.131 is sufficient to overcome the Hirabayash and Hitoo references as applied to claims 1-6.

Claims 1-6, 7, 9 and 10 are pending, claim 8 has been cancelled.

Claim Rejections - 35 USC § 103

Claims 1, 2 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Hirabayashi (European Patent Application No. 0605903 A1) in view of Lungu (US Patent No. 5,394,131).

Hirabayashi teaches:

limitations from claim 1, a method of driving an electromagnetic pump, the method comprising: conveying a fluid from a pump chamber, **FIG. 1 (2) C. 4 Lines 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37**, including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder, passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move, **C. 1 Lines 34-36,** the plunger in the axial direction inside the cylinder; and alternately applying a pulse voltage on a positive side and a negative side to drive the electromagnetic coil such that a change in voltage that occurs when the polarity of the pulse voltage is inverted has a continuous slope at least between the positive side and the negative side; **C. 2 Lines 43-45**, **the plunger (magnetic body, 10) is reciprocated by supplying an AC voltage which is known to have a continuous slope and also will have an alternating positive and negative side;**

Hirabayashi does not teach that a change in voltage when the voltage is inverted has a linearly or exponential slope, but Lungu does.

Lungu teaches:

a method of driving a piston, **FIG. 4 (3, 4)** in a cylinder **(10)**, wherein a reciprocating force is applied to the piston by applying a linearly continuous alternating voltage, **C. 10 Lines 28-34, examiner notes that trapezoidal waveforms cross a zero line in a continuously linear manner**; **Although Lungu teaches a current, one of ordinary skill in the art of electric motors would be capable of applying a trapezoidal waveform as a driving voltage as well, without inventive process.**

It would have been obvious to one having ordinary skill in the art at the time of the invention to provide a driving voltage as taught by Lungu for driving the pump of Hirabayashi in order to control the reciprocation of the pump piston.

limitations from claim 2, a method of driving an electromagnetic pump according to Claim 1, wherein the applying step comprises applying a sinewave-shaped pulse voltage, whose peaks are substantially flat, to drive the electromagnetic coil, **C. 10 Lines 28-34, a trapezoidal waveform will consist of flat peaks and can be considered to be sinewave shaped;**

Neither Hirabayashi nor Lungu teach the voltage driving range given in claim 3 below;

limitations from claim 3, a method of driving an electromagnetic pump according to Claim 1, wherein a driving voltage V(t) is applied in a range provided by Equation (1) below where a maximum value of the driving voltage V(t) applied to the electromagnetic coil is set at Vmax
0.8 Vmax * sin(wt) < V(t) < 1.5* Vmax * sin(wt) ... Equation (1) (where t: time and w: angular velocity).*

However it would have been an obvious design choice to use voltages within these parameters. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi (European Patent Application No. 0605903 A1) in view of Lungu (US Patent No. 5,394,131) in further view of Hitoo et al (Japanese Publication No. 09-126147).

A translated abstract is used to cite Hitoo in this office action.

Claim 4;

Hirabayashi teaches:

a method of driving an electromagnetic pump, the method comprising: conveying a fluid from a pump chamber, **FIG. 1 (2) C. 4 Line 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37**, including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder; passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder **C. 1 Lines 34-36;**

flowing a pulse current where a change in current that occurs when the polarity of the current is inverted has a continuous slope at least between the positive side and the negative side, **C. 6 Lines 6-9, the plunger (magnetic body, 10) is reciprocated by supplying an alternating current which is known to have a continuous slope**;

Hirabayashi does not teach that the change in current when the current is inverted has a linearly or exponential slope, but Lungu does.

Lungu teaches:

a method of driving a piston, **FIG. 4 (3, 4)** in a cylinder **(10)**, wherein a reciprocating force is applied to the piston by applying a linearly continuous alternating current, **C. 10 Lines 28-34, examiner notes that trapezoidal waveforms cross a zero line in a continuously linear manner**;

It would have been obvious to one having ordinary skill in the art at the time of the invention to provide a driving current as taught by Lungu for driving the pump of Hirabayashi in order to control the reciprocation of the pump piston.

Hirabayashi does not teach a method of detecting current supplied to the coils, but Hitoo does.

Hitoo teaches:

detecting the current flowing through the electromagnetic coil, **a current detecting device (4) is discussed in the translated abstract and is shown in the accompanying drawing;**

Hirabayashi and Hitoo teach and disclose the electromagnetic pump of claim 4 and Lungu further teaches:

limitations from claim 5, a method of driving an electromagnetic pump, further comprising: controlling the current so that a sinewave-shaped pulse current, whose peaks are substantially flat, flows in the electromagnetic coil, **C. 10 Lines 28-34, a trapezoidal waveform will consist of flat peaks and can be considered to be sinewave shaped;**

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the current detecting method and device of Hitoo with the magnetic type pump of Hirabayashi to control the stroke of the piston;

Neither Hirabayashi nor Lungu nor Hitoo disclose the current driving range given in claim 6 below;

limitations from claim 6, a method of driving an electromagnetic pump according to Claim 4, wherein a driving current I(t) is controlled in a range provided by Equation (2) below where a maximum value of the driving current I(t) that flows in the electromagnetic coil is set at I_{max}
$0.8 * I_{max} * \sin(wt) < I(t) < 1.5 * I_{max} * \sin(wt)$…Equation (2) (where t: time and w: angular velocity).

However it would have been an obvious design choice to use voltages within these parameters. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi (European Patent Application No. 0605903 A1), in view of Kurahashi et al (JP 03- 31913 B2).

A translated abstract is used to cite Kurahashi in this office action.

A translated copy of the Kurahashi document is included with this action.

Claim 7;

Hirabayashi teaches:

a method of driving an electromagnetic pump, the method comprising: conveying a fluid from a pump chamber, **FIG. 1 (2) C. 4 Line 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37,** including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder; passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder, **C. 1 Lines 34-36;**

Hirabayashi does not teach a driving voltage or current including a period of zero voltage nor does Hirabayashi teach a minute voltage pulse, but Kurahashi does.

Kurahashi teaches:

a method of driving an electromagnetic pump comprising: **examiner considers a compressor to be equivalent to a pump, it would be obvious to use the method taught by Kurahashi with the magnetic pump of Hirabayashi,** applying a pulse voltage or flowing a pulse current including a period where a voltage or current value is zero when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted; **FIG. 10 included below, shows a period of time labeled where the supplied voltage is zero before the voltage is inverted from positive to negative;** a method of driving an electromagnetic pump, wherein the pulse voltage or the pulse current flows so that a minute voltage pulse of at least 30% of a maximum voltage is applied or a minute current pulse of at least 30% of a maximum current flows before the period where the voltage or current value is zero, **FIG. 10 included below and amended by the examiner shows a minute voltage pulse before a period of zero voltage, when the voltage changes polarity there must be a period of zero voltage as it crosses the "0" line; the minute voltage pulse can be seen to be obviously above 30% of the max voltage;**

Claim 9;

Hirabayashi further teaches:

a method of driving an electromagnetic pump, the method comprising: conveying a fluid from a pump chamber, **FIG. 1 (2) C. 4 Line 32-33**, formed inside a cylinder, **FIG. 1 (4) C. 4 Lines 31-33**, by housing a plunger, **FIG. 1 (10) C. 4 Lines 37,** including a permanent magnet, **FIG. 1 (27) C. 4 Line 38**, inside the cylinder; passing a current through an aircore electromagnetic coil, **FIG. 1 (11a, 11b) C. 4 Lines 30-31**, fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder, **C. 1 Lines 34-36;**

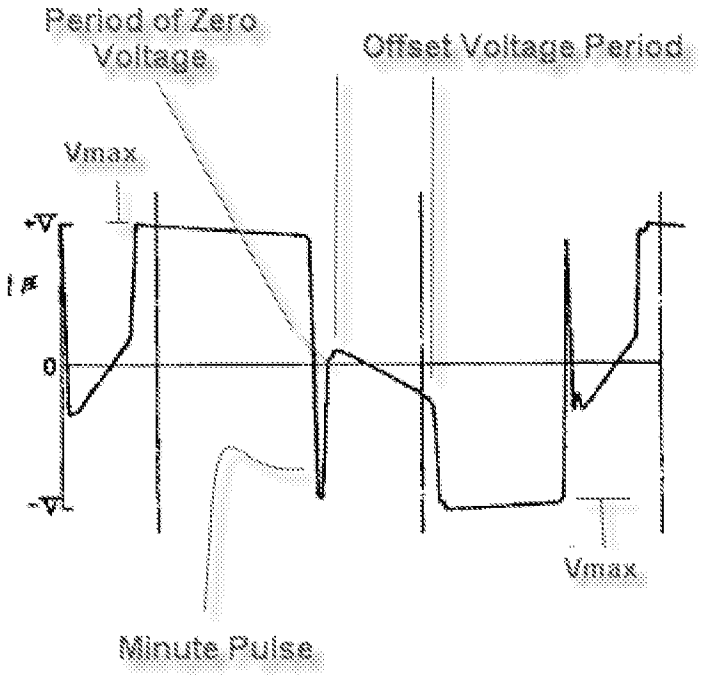
Hirabayashi does not teach an offset voltage, but Kurahashi does.

Kurahashi teaches:

a method of driving an electromagnetic pump, **examiner considers a compressor to be equivalent to a pump, it would be obvious to use the method taught by Kurahashi with the magnetic pump of Hirabayashi,** the method comprising: applying a pulse voltage or flowing a pulse current so that an offset voltage of no greater than 30% of a maximum voltage is applied or an offset current of no greater than 30% of a maximum current flows when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted, **FIG. 10 included below and amended by the examiner shows an offset voltage being applied when the polarity of the driving voltage changes, it does not appear that the offset voltage is ever greater than 30% of the max voltage**;

limitations from claim 10, a method of driving an electromagnetic pump, wherein the pulse voltage is applied or the pulse current flows so that before a period where the offset voltage is applied or the offset current flows, a minute voltage pulse of at least 30% of the maximum voltage is applied or a minute current pulse of at least 30% of the maximum current flows, **FIG. 10 included below and amended by the examiner shows a minute voltage pulse being applied before the offset voltage period**;

It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the driving method of Kurahashi with the magnetic pump of Hirabayashi to reduce vibrations cause by the reciprocating piston when the voltage polarity is switched.



Response to Arguments

Applicant's arguments filed on 08/11/2008 with respect to claims 1-6 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments with respect to claims 7, 9 and 10, filed 08/11/2008, have been fully considered but they are not persuasive.

Applicant argues that the pulse voltage taught by Hirabayashi is not "willfully input", and therefore does not read on the applicants claims. However examiner disagrees for the following reasons. The voltage pulse taught by Hirabayashi in FIG. 10, whether applied willingly or as an inherent feature is still producing the same effect on

the motor, and will read on the limitations of claims 7, 9 and 10. The same argument applies to the offset voltage.

Examiner also notes that applicant's arguments state "when the current direction is changed..., the zero voltage or the zero current period and the minute pulse current or voltage are combined"; however the claim language states only that "the pulse voltage or pulse current flows so that a minute voltage pulse of at least 30% of a maximum voltage is applied or a minute current pulse at least 30% of a maximum current flows ***before the period where the voltage or current value is zero***".

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER BOBISH whose telephone number is (571)270-5289. The examiner can normally be reached on Monday through Thursday, 7:30 - 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571)272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Bobish/
Examiner, Art Unit 3746

/Devon C Kramer/
Supervisory Patent Examiner, Art Unit 3746

/C. B./

Examiner, Art Unit 3746